IN THE CLAIMS

Please amend the claims as follows:

1. (Currently Amended) An apparatus for detecting and recovering data embedded in information material, the data having been embedded in the material using a transform domain representation of at least one of said data and said information material by arranging for the data to modulate a predetermined data sequence to form modulated data and combining said modulated data with said material, the apparatus comprising:

a transform processor operable to transform the material into a transform domain representation of said information material, and

a correlation processor operable to correlate transform domain data symbols bearing said modulated data from said transform domain representation with a reproduced version of said predetermined data sequence to form a correlation output signal and to recover said embedded data from said correlation output signal,

wherein said correlation processor is operable to perform said correlation of transform domain data symbols with data symbols of the predetermined data sequence, for a plurality of start positions in said transform domain, said start positions representing at least one relative possible shift of said transform domain data, and if said shift of said transform data represents a loss or corruption of transform domain data symbols, omitting corresponding symbols from said predetermined data sequence in said correlation, said lost or corrupted transform domain data symbols and said corresponding symbols of said predetermined data sequence not being included in calculating the correlation output signal.

2. (Currently Amended) An apparatus as claimed in Claim 1, wherein said plurality of start positions ~~includes~~ include representations of a plurality of possible shifts of said transform domain symbols from an original position in which said modulated data was combined with said symbols.

3. (Original) An apparatus as claimed in Claim 2, wherein said possible shifts correspond to shifts of an integer number of transform domain data symbols.

4. (Currently Amended) An apparatus as claimed in Claim 1, comprising:

a control processor operable to detect an amount by which said information material has shifted in accordance with which of said start positions provides a correlation output

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signal with the largest magnitude, said start position being subsequently used to detect and recover said embedded data in accordance with said correlation output signal.

5. (Currently Amended) An apparatus as claimed in Claim 1, wherein a shift of data symbols representing said information material by a first number of information material data symbols, produces a shift by a second number of transform domain symbols of said representation of said information material in said transform domain, said apparatus comprising:

a control processor operable to shift said information material by an amount determined in accordance with said first and second numbers to the effect that said plurality of start positions of said correlation of said predetermined data sequence with said transform domain data symbols represents a corresponding plurality of integer shifts of said information material data symbols.

6. (Original) An apparatus as claimed in Claim 5, wherein said correlation at each of said plurality of start positions with said transform domain data symbols is performed with and without said shift.

7. (Original) An apparatus as claimed in Claim 5, wherein said first and second numbers are two and one respectively, said information material being shifted by one data symbol, each of said start positions in said transform domain corresponding to odd numbers of shifts of said information material data symbols.

8. (Original) An apparatus as claimed in Claim 6, wherein said control processor is operable to detect said amount by which said information material has shifted in accordance with which of said start positions and which of said shift and not shifted version of said information material provides the correlation output signal with the highest value.

9. (Original) An apparatus as claimed in Claim 1, wherein said predetermined data sequence is a Pseudo Random Bit Sequence, said data symbols being bits.

10. (Original) An apparatus as claimed in Claim 1, wherein said transform domain has a plurality of sub-bands, said modulated data being added to at least one of said sub-bands,

said correlation processor being operable to correlate the transform domain data symbols from the sub-band with said predetermined data sequence except said excluded data symbols.

11. (Original) An apparatus as claimed in Claim 10, wherein said lost transform domain data symbols are a predetermined number of symbols at an edge of said sub-band.

12. (Currently Amended) An apparatus as claimed in Claim 1, wherein said transform is the discrete wavelet transform, said transform data symbols being wavelet coefficients, and each symbol of said modulated data being added to the wavelet coefficients.

13. (Currently Amended) An apparatus as claimed in Claim 1, wherein said information material in which said data is embedded is one of video images, audio signals, video, and and/or audio signals.

14. (Currently Amended) An apparatus for embedding data into information material, which data can be detected and recovered by the apparatus as claimed in any preceding Claim, said apparatus comprising:
a combining processor operable to modulate a predetermined data sequence with said data, to form modulated data and to combine said modulated data with said material in one of a transform domain representation or an inverse transform domain representation of said material,
wherein said combining processor is operable to form said modulated data into a transform domain representation, by introducing said data into at least one of a plurality of transform domain sub-bands, said modulated data being added to data symbols within said sub-band, including transform data symbols within extremes of said sub-band.

15. (Original) An apparatus as claimed in Claim 14, wherein said at least one sub-band represents in said transform domain low spatial frequencies in one direction and high spatial frequencies in another direction.

16. (Currently Amended) An apparatus as claimed in Claim 14, wherein said predetermined data sequence is a Pseudo Random Bit Sequence (PRBS), each bit of said PRBS being represented in bipolar form, said data to be embedded modulating the bits of said

PRBS by reversing the sign of each bit, and said modulated Pseudo Random Bit Sequences being added to respective transform domain data symbols of said sub-band.

17. (Currently Amended) An apparatus as claimed in Claim 14, wherein said transform is the Discrete Wavelet Transform, and said modulated data being added to said sub-band at each of said wavelet coefficients between the edges of said sub-band.

18. (Currently Amended) A method of detecting and recovering data embedded in information material, the data having been embedded in the material using a transform domain representation of at least one of said information material and said data by arranging for the data to modulate a predetermined data sequence to form modulated data and combining said modulated data with said material, the method comprising steps of:

forming a transform domain representation of said information material:[[,]]

correlating transform domain data symbols bearing said modulated data from said transform domain representation with a reproduced version of said predetermined data sequence, to form a correlation output signal:[[,]] and

recovering the embedded data from said correlation output signal,

wherein said correlating said predetermined data sequence with said transform domain data symbols, comprises steps of

correlating transform domain data symbols and data symbols of the predetermined data sequence,

repeating said correlation for at least one other start position in said transform domain, said start position representing at least one relative possible shift of said transform domain data, and

if said shift of said transform domain data represents a loss or corruption of transform domain data symbols,

omitting corresponding symbols from said predetermined data sequence, said lost or corrupted transform domain data symbols and said corresponding symbols of said predetermined data sequence not being included in calculating the correlation output signal.

19. (Original) A signal representing information material in which data has been embedded by the apparatus according to Claim 14.

20. (Currently Amended) A computer program <u>embodied in a computer readable medium</u> providing computer executable instructions, which when loaded on to a data processor configures said data processor to operate as an apparatus according to Claim 1.

21. (Currently Amended) A computer program <u>embodied in a computer readable medium</u> having computer executable instructions, which when loaded on to a data processor causes the data processor to perform the method according to Claim 18.

22. (Currently Amended) A computer program ~~product~~ <u>embodied in</u> ~~having~~ a computer readable medium having recorded thereon information signals representative of the computer program claimed in Claim 20.

23. (Currently Amended) An apparatus for detecting and recovering data embedded in information material, said data having been embedded in said information material by modulating a predetermined data sequence with the data to be embedded to form modulated data and combining said modulated data with said information material, said apparatus comprising:

a correlation processor operable in combination with a data sequence processor to form a correlation sequence, and

a data processor operable under control of the correlation processor to correlate information material data symbols, with which said modulated data have been combined, with said correlation sequence, to form a correlation output signal representing the correlation between the information material data symbols and said correlation data sequence, and to recover said embedded data from said correlation output signal,

wherein said correlation sequence comprises a plurality of predetermined data sequence versions, each of said versions being provided by shifting the predetermined data sequence used to form said modulated data with respect to others of said versions.

24. (Currently Amended) An apparatus as claimed in Claim 23, wherein the number of said plurality of versions of said predetermined data sequences is equal to a number of possible relative shifts of the information material data symbols to which the modulated data have been added, each of said plurality of predetermined data sequences being shifted with

respect to each other, <u>and</u> each shift representing a number of symbols by which the information material data symbols may have been shifted.

25. (Original) An apparatus as claimed in Claim 23, wherein each of said predetermined data sequence versions is a different predetermined data sequence of a set of possible predetermined data sequences which may have been used to form said modulated data.

26. (Currently Amended) An apparatus as claimed in Claim 23, wherein said predetermined data sequence is a Pseudo Random Bit Sequence <u>(PRBS)</u>.

27. (Currently Amended) An apparatus as claimed in Claim 23, wherein said correlation processor is operable in combination with said data sequence processor,
      to divide each of said predetermined data sequence versions into two or more groups, <u>and</u>
      to combine the predetermined data sequence version from each group to form a corresponding plurality of correlation data sequences, said data processor being arranged to correlate said information material data symbols with which said modulated data have been combined, with each of said correlation sequences, to form, for each, a correlation output signal, and said correlation processor is operable to identify which of said groups of predetermined data sequence versions includes the predetermined data sequence version for recovering said embedded data symbols from the corresponding correlation output signal.

28. (Original) An apparatus as claimed in Claim 27, wherein said correlation processor is operable to compare said correlation output signal with a threshold and to identify which of said groups includes the predetermined data sequence version for recovering said embedded data from the comparison.

29. (Original) An apparatus as claimed in Claim 27, wherein said correlation processor is operable to divide said identified group into further groups, each of said groups being combined to form further correlation sequences and to identify which of said further groups includes said predetermined data sequence for recovering said embedded data, said

dividing and said identifying being repeated until the predetermined data sequence version for recovering said embedded data is identified.

30. (Original) An apparatus as claimed in Claim 23, wherein said correlation sequence is formed by selecting versions of said predetermined data sequence and reversing the polarity of said selected versions of said predetermined data sequence before combining said predetermined data sequence versions to form said correlation sequence.

31. (Currently Amended) An apparatus as claimed in Claim 23, wherein said data is combined with said information material by forming a transform domain representation of said data and combining said data with said information material in either said transform domain or the inverse transform domain, said apparatus comprising:
a transform processor operable to generate a transform domain representation of said information material in which said data has been embedded, said correlation processor being operable to recover said embedded data symbols by correlating transform domain data symbols with which said embedded data has been combined with said correlation sequence.

32. (Currently Amended) An apparatus as claimed in Claim 31, wherein said transform is the discrete wavelet transform, the data symbols in the transform domain being divided into each of a plurality of sub-bands comprising wavelet coefficients, and the data being added to at least one of the sub-bands.

33. (Currently Amended) An apparatus as claimed in Claim 26, wherein each bit of said PRBS is represented in bipolar form, said data to be embedded modulating the symbols of said PRBS by reversing the sign of each bit, and said modulated Pseudo Random Bit Sequences being combined with respective wavelet coefficients of said sub-band.

34. (Currently Amended) An apparatus as claimed in Claim 31, comprising:
a pre-processor operable to receive said information material and to generate a shifted copy of the received information material, said transform processor being operable to generate a transform domain version of said received information material and said shifted copy of said information material, and said correlation processor is operable to recover said

embedded data by correlating said transform domain data of said received information material and said shifted copy of said information material.

35. (Original) An apparatus as claimed in Claim 23, wherein said information material is one of audio material, video material and audio/video information material.

36. (Currently Amended) A method for detecting and recovering data embedded in information material, said data having been embedded in said information material by modulating a predetermined data sequence with the data to be embedded to form modulated data and combining said modulated data with said information material, said method comprising steps of:

correlating information material data symbols to which the modulated data have been added with a correlation data sequence, to form a correlation output signal representing the correlation between the information material data symbols and said correlation data sequence, and

recovering said embedded data from said correlation output signal,

wherein said correlation data sequence comprises a plurality of predetermined data sequence versions, each of said versions being provided by shifting the predetermined data sequence used to form said modulated data with respect to others of said versions.

37. (Original) A method as claimed in Claim 36, wherein each of said predetermined data sequence versions is a different predetermined data sequence of a set of possible predetermined data sequences which may have been used to form said modulated data.

38. (Currently Amended) A computer program embodied in a computer readable medium for providing computer executable instructions, which when loaded on to a data processor configures said data processor to operate as an apparatus according to Claim 23.

39. (Currently Amended) A computer program embodied in a computer readable medium having computer executable instructions, which when loaded on to a data processor causes the data processor to perform the method according to Claim 36.

40. (Currently Amended) A computer program ~~product~~ embodied in ~~having~~ a computer readable medium having recorded thereon information signals representative of the computer program claimed in Claim 38.

41. (Currently Amended) A computer program ~~product having~~ embodied in a computer readable medium having recorded thereon information signals representative of the computer program claimed in Claim 39.

42. (Currently Amended) An apparatus for detecting and recovering data embedded in information material, the data having been embedded in the material using a transform domain representation of at least one of said information material and said data by arranging for the data to modulate a predetermined data sequence to form modulated data and combining said modulated data with said material, the apparatus comprising:

means for forming a transform domain representation of said information material;[[,]]

means for correlating transform domain data symbols bearing said modulated data from said transform domain representation with a reproduced version of said predetermined data sequence, to form a correlation output signal;[[,]] and

means for recovering the embedded data from said correlation output signal,

wherein said correlating said predetermined data sequence with said transform domain data symbols, comprises

means for correlating transform domain data symbols and data symbols of the predetermined data sequence,

means for repeating said correlation for at least one other start position in said transform domain, said start position representing at least one relative possible shift of said transform domain data, and if said shift of said transform domain data represents a loss or corruption of transform domain data symbols, and

means for omitting corresponding symbols from said predetermined data sequence, said lost or corrupted transform domain data symbols and said corresponding symbols of said predetermined data sequence not being included in calculating the correlation output signal.

43. (Currently Amended) An apparatus for detecting and recovering data embedded in information material, said data having been embedded in said information material by

modulating a predetermined data sequence with the data to be embedded to form modulated data and combining said modulated data with said information material, said apparatus comprising:

      means for correlating information material data symbols to which the modulated data have been added with a correlation data sequence, to form a correlation output signal representing the correlation between the information material data symbols and said correlation data sequence, and

      means for recovering said embedded data from said correlation output signal,

      wherein said correlation data sequence comprises a plurality of predetermined data sequence versions, each of said versions being provided by shifting the predetermined data sequence used to form said modulated data with respect to others of said versions.